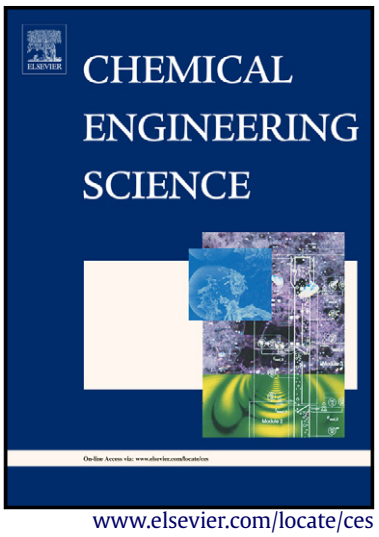

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Robust Model Predictive Control of Nonlinear Processes Represented by Wiener or Hammerstein Models

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Abstract: Representing nonlinear systems by linear models along with structured or unstructured uncertainties and applying robust control strategies could reduce the computational complexity in comparison with implementing the nonlinear model predictive controllers. In this paper design of robust model predictive controllers which are based on special classes of nonlinear systems representations called Wiener and Hammerstein are presented. The proposed algorithms approximate the nonlinear systems by uncertain linear models and reduce online the computational demands in the control implementation. The advantages of the proposed approaches are illustrated by two examples.

Keywords: Robust MPC; Wiener; Hammerstein; LMI; level control; pH process.

1. Introduction

Most industrial processes are inherently nonlinear. Therefore practical control systems with large operating regions have to deal with this nonlinearity. Model predictive control (MPC) is a well-known control strategy that handles constraints and has guaranteed stability for linear systems but using a non-linear model in MPC generally changes the control problem from a convex

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